Ephemeris for Physical Observations of the Moon for 1901.
By A. C. D. Crommelin.

Greenwich Midnight.	Selenographical Colong. of the Sun	Lat. of the Sun	Geocentric Libration Sel. Long. of the Earth	Lat. of the Earth	Combined Amount.	Direction.	C.
1901							
Jan. 1	48·76	+ 1·00	+ 2·82	+ 0·19	2·83	273·9	347·12
2	60·89	+ 1·02	+ 3·60	+ 1·81	4·03	296·7	352·77
3	73·01	+ 1·05	+ 4·23	+ 3·30	5·37	308·0	358·79
4	85·14	+ 1·07	+ 4·68	+ 4·58	6·55	314·4	4·71
5	97·26	+ 1·10	+ 4·87	+ 5·58	7·40	318·9	10·14
6	109·39	+ 1·12	+ 4·85	+ 6·27	7·93	322·3	14·83
7	121·53	+ 1·14	+ 4·50	+ 6·62	8·01	325·8	18·64
8	133·66	+ 1·16	+ 3·87	+ 6·65	7·69	329·8	21·50
9	145·80	+ 1·17	+ 2·96	+ 6·36	7·02	335·0	23·39
10	157·95	+ 1·19	+ 1·84	+ 5·80	6·08	342·4	24·29
11	170·10	+ 1·21	+ 0·56	+ 5·00	5·03	353·6	24·21
12	182·26	+ 1·23	− 0·80	+ 3·98	4·06	11·4	23·12
13	194·42	+ 1·24	− 2·15	+ 2·80	3·53	37·5	21·03
14	206·59	+ 1·25	− 3·39	+ 1·48	3·70	66·4	17·93
15	218·76	+ 1·27	− 4·43	+ 0·08	4·43	89·0	13·89
16	230·94	+ 1·28	− 5·20	− 1·36	5·38	104·7	9·03
17	243·13	+ 1·29	− 5·63	− 2·76	6·27	116·1	3·57
18	255·31	+ 1·30	− 5·68	− 4·06	6·99	125·6	357·81
19	267·50	+ 1·32	− 5·34	− 5·16	7·42	134·0	352·12
20	279·69	+ 1·33	− 4·65	− 5·99	7·58	142·2	346·87
21	291·89	+ 1·34	− 3·68	− 6·46	7·44	150·3	342·34
22	304·07	+ 1·35	− 2·51	− 6·54	7·00	159·0	338·85
23	316·26	+ 1·36	− 1·26	− 6·21	6·34	168·5	336·58
24	328·44	+ 1·38	− 0·03	− 5·49	5·49	179·7	335·62
25	340·61	+ 1·39	+ 1·10	− 4·42	4·55	194·0	336·12
26	352·78	+ 1·40	+ 2·08	− 3·09	3·72	213·9	338·07
27	4·94	+ 1·42	+ 2·90	− 1·58	3·30	241·4	341·21
28	17·09	+ 1·43	+ 3·55	0·00	3·55	270·0	345·85
29	29·23	+ 1·44	+ 4·05	+ 1·56	4·34	291·1	351·21
30	41·37	+ 1·45	+ 4·40	+ 3·02	5·34	304·5	357·03
31	53·51	+ 1·47	+ 4·61	+ 4·30	6·30	313·0	2·89
Feb. 1	65·64	+ 1·48	+ 4·67	+ 5·32	7·08	318·7	8·43
2	77·78	+ 1·49	+ 4·55	+ 6·05	7·57	323·1	13·35
3	89·91	+ 1·50	+ 4·23	+ 6·46	7·72	326·8	17·45

Greenwich Midnight.	Selenographical Colong. | Lat. of the Sun.		Geocentric Libration Sel. Long. | Lat. of the Earth.		Combined Amount.	Direc- tion.	C.
1901.							
Feb. 4	102·04	+ 1·50	+ 3·69	+ 6·54	7·51	330·6	20·64
5	114·18	+ 1·51	+ 2·93	+ 6·32	6·97	335·1	22·88
6	126·32	+ 1·51	+ 1·95	+ 5·80	6·12	341·4	24·13
7	138·47	+ 1·52	+ 0·78	+ 5·04	5·10	351·2	24·37
8	150·62	+ 1·52	− 0·53	+ 4·07	4·10	7·4	23·61
9	162·77	+ 1·52	− 1·92	+ 2·92	3·49	33·3	21·84
10	174·93	+ 1·52	− 3·30	+ 1·64	3·68	63·6	19·10
11	187·10	+ 1·52	− 4·58	+ 0·29	4·59	86·4	15·43
12	199·27	+ 1·52	− 5·66	− 1·10	5·77	101·0	10·92
13	211·45	+ 1·52	− 6·44	− 2·47	6·90	111·0	5·74
14	223·63	+ 1·52	− 6·84	− 3·75	7·80	118·7	0·15
15	235·82	+ 1·51	− 6·79	− 4·88	8·36	125·7	354·44
16	248·01	+ 1·51	− 6·27	− 5·77	8·52	132·6	348·95
17	260·20	+ 1·51	− 5·31	− 6·33	8·26	140·0	344·06
18	272·41	+ 1·51	− 3·98	− 6·51	7·63	148·6	340·06
19	284·61	+ 1·51	− 2·37	− 6·26	6·69	159·3	337·22
20	296·81	+ 1·51	− 0·67	− 5·59	5·63	173·2	335·76
21	309·00	+ 1·51	+ 0·98	− 4·54	4·65	192·2	335·80
22	321·20	+ 1·51	+ 2·45	− 3·20	4·03	217·4	337·39
23	333·38	+ 1·51	+ 3·67	− 1·67	4·03	245·5	340·44
24	345·56	+ 1·51	+ 4·59	− 0·06	4·59	269·2	344·73
25	357·74	+ 1·50	+ 5·22	+ 1·52	5·44	286·2	349·97
26	9·91	+ 1·50	+ 5·58	+ 2·98	6·33	298·1	355·71
27	22·07	+ 1·50	+ 5·70	+ 4·25	7·11	306·7	1·55
28	34·22	+ 1·49	+ 5·60	+ 5·27	7·69	313·3	7·12
Mar. 1	46·37	+ 1·49	+ 5·32	+ 6·01	8·02	318·5	12·13
2	58·52	+ 1·48	+ 4·87	+ 6·44	8·07	322·9	16·42
3	70·67	+ 1·48	+ 4·24	+ 6·56	7·81	327·1	19·85
4	82·82	+ 1·47	+ 3·45	+ 6·36	7·24	331·5	22·35
5	94·96	+ 1·46	+ 2·49	+ 5·87	6·38	337·0	23·89
6	107·11	+ 1·45	+ 1·36	+ 5·13	5·31	345·2	24·42
7	119·26	+ 1·43	+ 0·10	+ 4·16	4·16	358·6	23·97
8	131·42	+ 1·42	− 1·26	+ 3·03	3·28	22·6	22·49
9	143·58	+ 1·41	− 2·67	+ 1·76	3·20	56·6	20·03
10	155·74	+ 1·40	− 4·06	+ 0·42	4·08	84·1	16·64
11	167·91	+ 1·38	− 5·36	− 0·96	5·45	100·2	12·42
12	180·09	+ 1·37	− 6·46	− 2·32	6·87	109·8	7·54
13	192·27	+ 1·35	− 7·29	− 3·60	8·13	116·3	2·17

Greenwich Midnight.	Selenographical Colong. of the Sun.	Lat.	Geocentric Libration Sel. Long. of the Earth.	Lat.	Combined Amount.	Direc- tion.	C.
1901.	°	°	°	°	°	°	°
Mar. 14	204·45	+1·34	−7·73	−4·73	9·06	121·5	356·61
15	216·64	+1·32	−7·73	−5·66	9·58	126·2	351·13
16	228·85	+1·31	−7·25	−6·30	9·61	131·0	346·05
17	241·05	+1·29	−6·24	−6·59	9·07	136·6	341·67
18	253·26	+1·28	−4·79	−6·46	8·05	143·4	338·30
19	265·48	+1·27	−3·01	−5·90	6·62	153·0	336·19
20	277·70	+1·25	−1·05	−4·92	5·03	168·0	335·57
21	289·92	+1·24	+0·92	−3·58	3·70	194·4	336·57
22	302·13	+1·23	+2·74	−2·01	3·40	233·7	339·19
23	314·34	+1·21	+4·28	−0·33	4·29	265·6	343·25
24	326·55	+1·20	+5·47	+1·35	5·63	283·9	348·40
25	338·75	+1·19	+6·29	+2·89	6·92	294·7	354·20
26	350·94	+1·17	+6·72	+4·23	7·94	302·2	0·17
27	3·12	+1·16	+6·82	+5·30	8·64	307·9	5·89
28	15·30	+1·14	+6·61	+6·08	8·98	312·6	11·07
29	27·47	+1·12	+6·16	+6·54	8·99	316·7	15·52
30	39·65	+1·10	+5·47	+6·68	8·63	320·7	19·14
31	51·81	+1·08	+4·61	+6·51	7·98	324·7	21·85
April 1	63·98	+1·06	+3·58	+6·05	7·03	329·4	23·61
2	76·15	+1·04	+2·43	+5·32	5·85	335·5	24·41
3	88·31	+1·01	+1·16	+4·37	4·52	345·1	24·20
4	100·48	+0·99	−0·18	+3·23	3·24	3·2	23·00
5	112·65	+0·97	−1·59	+1·95	2·52	39·2	20·78
6	124·82	+0·94	−2·98	+0·59	3·04	78·8	17·62
7	136·99	+0·92	−4·33	−0·80	4·40	100·5	13·61
8	149·16	+0·89	−5·58	−2·17	5·99	111·3	8·92
9	161·35	+0·87	−6·64	−3·47	7·49	117·6	3·79
10	173·53	+0·84	−7·45	−4·63	8·78	121·9	358·29
11	185·72	+0·82	−7·91	−5·60	9·69	125·3	352·89
12	197·92	+0·79	−7·98	−6·30	10·17	128·3	347·79
13	210·13	+0·77	−7·60	−6·69	10·13	131·4	343·25
14	222·34	+0·75	−6·74	−6·69	9·50	134·8	339·54
15	234·56	+0·72	−5·44	−6·28	8·31	139·1	336·91
16	246·79	+0·70	−3·76	−5·44	6·61	145·4	335·62
17	259·02	+0·68	−1·82	−4·21	4·59	156·6	335·88
18	271·25	+0·66	+0·22	−2·67	2·68	184·7	337·80
19	283·49	+0·64	+2·19	−0·95	2·39	246·5	341·34
20	295·72	+0·62	+3·96	+0·83	4·05	281·8	346·23

Greenwich Midnight.	Selenographical Colong.	Lat. of the Sun.	Geocentric Libration Sel. Long.	Lat. of the Earth.	Combined Amount.	Direction.	C.
1901. April 21	307·95	+0·60	+5·40	+2·51	5·95	294·9	352·03
22	320·17	+0·57	+6·45 ·	+3·99	7·58	301·7	358·20
23	332·39	+0·55	+7·09	+5·19	8·78	306·2	4·22
24	344·60	+0·53	+7·31	+6·07	9·50	309·7	9·73
25	356·80	+0·50	+7·15	+6·61	9·75	312·8	14·48
26	9·01	+0·48	+6·65	+6·80	9·52	315·6	18·36
27	21·20	+0·45	+5·88	+6·68	8·91	318·6	21·32
28	33·39	+0·42	+4·88	+6·26	7·93	322·1	23·31
29	45·58	+0·40	+3·71	+5·57	6·70	326·3	24·34
30	57·76	+0·37	+2·42	+4·64	5·23	332·5	24·38
May 1	69·94	+0·34	+1·06	+3·52	3·68	343·2	23·40
2	82·12	+0·31	−0·33	+2·25	2·27	8·3	21·45
3	94·30	+0·28	−1·71	+0·88	1·92	62·8	18·51
4	106·49	+0·25	−3·04	−0·54	3·09	100·1	14·68
5	118·67	+0·22	−4·27	−1·94	4·69	114·4	10·11
6	130·85	+0·19	−5·36	−3·27	6·28	121·4	5·00
7	143·04	+0·16	−6·27	−4·46	7·69	125·4	359·62
8	155·23	+0·13	−6·94	−5·47	8·83	128·2	354·23
9	167·43	+0·10	−7·32	−6·23	9·61	130·4	349·09
10	179·64	+0·07	−7·37	−6·69	9·95	132·2	344·47
11	191·85	+0·04	−7·06	−6·80	9·80	133·9	340·59
12	204·06	+0·02	−6·37	−6·52	9·11	135·7	337·68
13	216·29	−0·01	−5·30	−5·84	7·88	137·8	335·92
14	228·52	−0·03	−3·90	−4·77	6·16	140·7	335·55
15	240·75	−0·06	−2·22	−3·37	4·04	146·6	336·73
16	253·00	−0·08	−0·40	−1·71	1·76	166·8	339·53
17	265·25	−0·10	+1·46	+0·07	1·46	272·7	343·86
18	277·50	−0·12	+3·20	+1·83	3·69	299·8	349·40
19	289·74	−0·15	+4·73	+3·45	5·85	306·1	355·49
20	301·98	−0·17	+5·91	+4·80	7·62	309·1	1·91
21	314·22	−0·19	+6·70	+5·83	8·88	311·0	7·82
22	326·45	−0·22	+7·06	+6·50	9·59	312·6	13·00
23	338·68	−0·24	+7·00	+6·80	9·76	314·2	17·28
24	350·90	−0·27	+6·56	+6·76	9·41	315·9	20·59
25	3·12	−0·30	+5·79	+6·40	8·63	317·9	22·89
26	15·33	−0·33	+4·75	+5·77	7·48	320·5	24·19
27	27·54	−0·35	+3·51	+4·89	6·02	324·3	24·49
28	39·74	−0·38	+2·17	+3·81	4·39	330·3	23·79

Greenwich Midnight.	Selenographical Colong. | Lat. of the Sun.		Geocentric Libration Sel. Long. | Lat. of the Earth.		Combined Amount.	Direc-tion.	C.
1901.	°	°	°	°	°	°	°
May 29	51·94	−0·41	+0·78	+2·57	2·69	343·1	22·08
30	64·13	−0·44	−0·61	+1·22	1·37	26·6	19·39
31	76·33	−0·47	−1·92	−0·19	1·93	95·7	15·76
June 1	88·52	−0·50	−3·12	−1·60	3·51	117·1	11·34
2	100·71	−0·53	−4·17	−3·06	5·17	122·3	6·30
3	112·91	−0·55	−5·01	−4·19	6·53	129·9	0·91
4	125·10	−0·58	−5·64	−5·25	7·70	132·9	355·44
5	137·29	−0·61	−6·05	−6·06	8·57	135·0	350·20
6	149·49	−0·64	−6·20	−6·58	9·04	136·7	345·45
7	161·69	−0·66	−6·10	−6·76	9·11	137·9	341·40
8	173·90	−0·68	−5·73	−6·57	8·72	138·9	338·28
9	186·11	−0·71	−5·10	−6·00	7·88	139·6	336·24
10	198·34	−0·73	−4·22	−5·07	6·60	140·2	335·48
11	210·57	−0·75	−3·11	−3·80	4·91	140·7	336·12
12	222·81	−0·77	−1·79	−2·28	2·90	141·9	338·78
13	235·05	−0·79	−0·33	−0·59	0·68	150·8	341·96
14	247·30	−0·81	+1·19	+1·14	1·65	313·8	346·97
15	259·56	−0·83	+2·68	+2·80	3·87	316·3	352·90
16	271·82	−0·85	+4·04	+4·25	5·86	316·5	359·24
17	284·07	−0·87	+5·14	+5·41	7·46	316·5	5·46
18	296·32	−0·89	+5·93	+6·21	8·59	316·3	11·06
19	308·57	−0·91	+6·33	+6·64	9·17	316·4	15·82
20	320·81	−0·93	+6·32	+6·71	9·22	316·7	19·57
21	333·04	−0·95	+5·92	+6·44	8·75	317·4	22·26
22	345·27	−0·97	+5·17	+5·86	7·81	318·6	23·92
23	357·50	−0·99	+4·14	+5·04	6·52	320·6	24·53
24	9·72	−1·01	+2·90	+4·01	4·95	324·1	24·12
25	21·93	−1·03	+1·54	+2·81	3·20	331·3	22·70
26	34·14	−1·06	+0·14	+1·50	1·51	354·7	20·28
27	46·35	−1·08	−1·21	+0·12	1·22	84·3	16·93
28	58·55	−1·10	−2·44	−1·27	2·75	117·5	12·72
29	70·75	−1·12	−3·48	−2·63	4·36	127·1	7·81
30	82·95	−1·14	−4·29	−3·88	5·78	132·1	2·44
July 1	95·14	−1·16	−4·85	−4·97	6·95	135·7	356·90
2	107·33	−1·18	−5·14	−5·83	7·77	138·6	351·49
3	119·53	−1·20	−5·17	−6·39	8·22	141·0	346·52
4	131·72	−1·22	−4·97	−6·63	8·29	143·1	342·24
5	143·92	−1·24	−4·56	−6·49	7·93	144·9	338·87

Greenwich Midnight.	Selenographical Colong. | Lat. of the Sun.		Geocentric Libration Sel. Long. | Lat. of the Earth.		Combined Amount.	Direction.	C.
1901.							
July 6	156·12	−1·25	−3·98	−5·99	7·19	146·4	336·58
7	168·33	−1·27	−3·27	−5·13	6·08	147·5	335·52
8	180·55	−1·28	−2·42	−3·95	4·63	148·5	335·82
9	192·78	−1·29	−1·49	−2·52	2·93	149·4	337·54
10	205·01	−1·30	−0·46	−0·93	1·04	153·7	340·72
11	217·25	−1·31	+0·63	+0·73	0·96	319·2	345·39
12	229·49	−1·32	+1·75	+2·34	2·92	323·2	350·74
13	241·74	−1·33	+2·85	+3·80	4·75	323·1	356·88
14	253·99	−1·34	+3·86	+5·01	6·32	322·4	3·11
15	266·25	−1·35	+4·70	+5·90	7·54	321·5	8·97
16	278·50	−1·36	+5·28	+6·43	8·32	320·6	14·09
17	290·75	−1·37	+5·55	+6·59	8·62	319·9	18·30
18	303·00	−1·38	+5·47	+6·40	8·42	319·5	21·43
19	315·24	−1·39	+5·02	+5·90	7·75	319·6	23·48
20	327·48	−1·40	+4·25	+5·12	6·65	320·3	24·45
21	339·71	−1·42	+3·20	+4·13	5·23	322·2	24·38
22	351·94	−1·43	+1·95	+2·97	3·55	326·7	23·27
23	4·16	−1·44	+0·58	+1·69	1·79	341·1	21·16
24	16·38	−1·45	−0·82	+0·35	0·89	66·9	18·10
25	28·59	−1·46	−2·13	−1·02	2·36	115·6	14·17
26	40·80	−1·47	−3·29	−2·36	4·05	125·6	9·48
27	53·00	−1·48	−4·21	−3·62	5·55	130·7	4·26
28	65·20	−1·49	−4·84	−4·72	6·76	134·3	358·72
29	77·39	−1·50	−5·12	−5·61	7·60	137·6	353·20
30	89·58	−1·50	−5·08	−6·23	8·04	140·8	347·98
31	101·76	−1·51	−4·71	−6·52	8·04	144·2	343·39
Aug. 1	113·95	−1·51	−4·09	−6·44	7·63	147·6	339·65
2	126·13	−1·52	−3·28	−5·97	6·81	151·2	337·00
3	138·32	−1·52	−2·35	−5·14	5·65	155·4	335·62
4	150·52	−1·52	−1·37	−3·99	4·22	161·1	335·60
5	162·72	−1·52	−0·40	−2·59	2·62	171·2	337·04
6	174·93	−1·52	+0·55	−1·04	1·18	207·9	339·89
7	187·15	−1·52	+1·44	+0·58	1·55	291·9	344·04
8	199·38	−1·52	+2·29	+2·16	3·15	313·3	349·25
9	211·61	−1·52	+3·08	+3·60	4·74	319·4	355·13
10	223·84	−1·51	+3·79	+4·81	6·12	321·8	1·25
11	236·08	−1·51	+4·40	+5·73	7·22	322·5	7·15
12	248·33	−1·51	+4·85	+6·31	7·95	322·5	12·48

Greenwich Midnight.	Selenographical Colong.	Lat. of the Sun.	Geocentric Libration Sel. Long.	Lat. of the Earth.	Combined Amount.	Direction.	C.
1901.	°	°	°	°		°	
Aug. 13	260·58	− 1·51	+ 5·09	+ 6·53	8·27	322·1	16·97
14	272·82	− 1·51	+ 5·08	+ 6·41	8·18	321·6	20·47
15	285·07	− 1·51	+ 4·79	+ 5·95	7·63	321·2	22·91
16	297·31	− 1·50	+ 4·20	+ 5·22	6·70	321·2	24·27
17	309·55	− 1·50	+ 3·32	+ 4·25	5·39	322·0	24·54
18	321·78	− 1·50	+ 2·21	+ 3·10	3·81	324·5	23·75
19	334·01	− 1·50	+ 0·91	+ 1·84	2·05	333·7	21·96
20	346·23	− 1·50	− 0·48	+ 0·50	0·69	43·8	19·20
21	358·45	− 1·50	− 1·89	− 0·86	2·08	114·5	15·56
22	10·66	− 1·50	− 3·21	− 2·19	3·89	124·3	11·13
23	22·87	− 1·49	− 4·35	− 3·44	5·54	128·3	6·13
24	35·07	− 1·49	− 5·21	− 4·56	6·92	131·2	0·73
25	47·26	− 1·48	− 5·74	− 5·49	7·94	133·7	355·21
26	59·45	− 1·48	− 5·87	− 6·15	8·51	136·3	349·87
27	71·63	− 1·47	− 5·58	− 6·51	8·57	139·4	344·99
28	83·81	− 1·46	− 4·91	− 6·50	8·15	142·9	340·87
29	95·98	− 1·45	− 3·91	− 6·10	7·25	147·3	337·76
30	108·16	− 1·44	− 2·69	− 5·31	5·95	153·1	335·87
31	120·33	− 1·43	− 1·35	− 4·17	4·38	162·1	335·44
Sept. 1	132·51	− 1·42	+ 0·01	− 2·75	2·75	180·2	336·50
2	144·69	− 1·40	+ 1·29	− 1·16	1·74	228·0	339·07
3	156·88	− 1·39	+ 2·43	+ 0·49	2·48	281·4	343·00
4	169·08	− 1·38	+ 3·40	+ 2·10	4·00	301·7	348·04
5	181·28	− 1·36	+ 4·19	+ 3·55	5·49	310·3	353·80
6	193·49	− 1·35	+ 4·82	+ 4·78	6·79	314·8	359·85
7	205·71	− 1·33	+ 5·25	+ 5·72	7·76	317·5	5·76
8	217·93	− 1·32	+ 5·51	+ 6·34	8·40	319·0	11·17
9	230·16	− 1·30	+ 5·58	+ 6·60	8·64	319·8	15·83
10	242·39	− 1·29	+ 5·45	+ 6·51	8·49	320·1	19·58
11	254·62	− 1·28	+ 5·09	+ 6·10	7·94	320·2	22·31
12	266·86	− 1·27	+ 4·51	+ 5·39	7·03	320·1	23·99
13	279·09	− 1·25	+ 3·68	+ 4·44	5·76	320·4	24·59
14	291·32	− 1·24	+ 2·65	+ 3·31	4·24	321·3	24·13
15	303·55	− 1·22	+ 1·43	+ 2·03	2·48	324·8	22·64
16	315·77	− 1·21	+ 0·07	+ 0·68	0·68	354·1	20·15
17	327·99	− 1·20	− 1·36	− 0·69	1·52	116·9	16·76
18	340·20	− 1·18	− 2·79	− 2·04	3·46	126·2	12·60
19	352·41	− 1·17	− 4·12	− 3·31	5·29	128·8	7·81

Greenwich Midnight.	Selenographical Colong.	Lat. of the Sun.	Geocentric Libration Sel. Long.	Lat. of the Earth.	Combined Amount.	Direction.	C.
1901. Sept. 20	4·62	−1·15	−5·28	−4·45	6·90	130·1	2·61
21	16·81	−1·14	−6·16	−5·41	8·20	131·3	357·20
22	29·00	−1·12	−6·69	−6·14	9·07	132·5	351·86
23	41·18	−1·10	−6·80	−6·58	9·47	134·1	346·85
24	53·36	−1·08	−6·47	−6·67	9·29	135·9	342·43
25	65·53	−1·06	−5·68	−6·38	8·55	138·3	338·89
26	77·69	−1·04	−4·49	−5·69	7·25	141·7	336·47
27	89·85	−1·01	−2·99	−4·61	5·50	147·0	335·42
28	102·01	−0·99	−1·30	−3·21	3·46	158·0	335·90
29	114·16	−0·96	+0·43	−1·58	1·64	195·2	337·99
30	126·33	−0·94	+2·10	+0·16	2·12	274·3	341·61
Oct. 1	138·49	−0·91	+3·58	+1·86	4·04	297·5	346·52
2	150·67	−0·89	+4·82	+3·42	5·91	305·4	352·29
3	162·85	−0·86	+5·76	+4·74	7·46	309·5	358·44
4	175·03	−0·84	+6·40	+5·75	8·60	311·9	4·47
5	187·23	−0·82	+6·73	+6·41	9·29	313·6	10·03
6	199·43	−0·79	+6·80	+6·72	9·57	314·7	14·86
7	211·63	−0·77	+6·58	+6·68	9·38	315·4	18·80
8	223·84	−0·75	+6·13	+6·30	8·79	315·8	21·75
9	236·06	−0·72	+5·45	+5·64	7·84	316·0	23·68
10	248·27	−0·70	+4·57	+4·71	6·56	315·9	24·57
11	260·49	−0·68	+3·51	+3·59	5·02	315·6	24·39
12	272·70	−0·66	+2·30	+2·32	3·26	315·3	23·18
13	284·92	−0·64	+0·96	+0·95	1·35	314·7	20·96
14	297·13	−0·61	−0·45	−0·44	0·63	134·4	17·80
15	309·34	−0·59	−1·89	−1·82	2·62	133·9	13·84
16	321·55	−0·57	−3·30	−3·12	4·54	133·4	9·29
17	333·75	−0·55	−4·62	−4·30	6·31	133·0	4·15
18	345·94	−0·52	−5·77	−5·31	7·84	132·6	358·85
19	358·13	−0·50	−6·68	−6·09	9·05	132·4	353·58
20	10·32	−0·47	−7·26	−6·61	9·81	132·3	348·54
21	22·49	−0·45	−7·47	−6·80	10·10	132·3	344·00
22	34·67	−0·42	−7·24	−6·75	9·90	133·0	340·19
23	46·83	−0·39	−6·55	−6·11	8·96	133·0	337·33
24	58·98	−0·36	−5·43	−5·18	7·50	133·6	335·68
25	71·13	−0·33	−3·91	−3·88	5·51	134·8	335·45
26	83·28	−0·30	−2·10	−2·30	3·11	137·6	336·83
27	95·41	−0·27	−0·15	−0·54	0·56	164·5	339·85

Greenwich Midnight.	Selenographical Colong. of the Sun.	Lat.	Geocentric Libration Sel. Long. of the Earth.	Lat.	Combined Amount.	Direction.	C.
1901. Oct. 28	107·55	−0·24	+1·82	+1·27	2·22	304·9	344·39
29	119·70	−0·20	+3·65	+2·97	4·70	309·1	350·07
30	131·85	−0·17	+5·23	+4·44	6·86	310·3	356·35
31	144·00	−0·14	+6·46	+5·59	8·55	310·7	2·69
Nov. 1	156·16	−0·11	+7·29	+6·37	9·67	311·1	8·60
2	168·33	−0·08	+7·71	+6·77	10·27	311·3	13·76
3	180·50	−0·05	+7·74	+6·79	10·30	311·3	17·98
4	192·69	−0·03	+7·41	+6·48	9·85	311·2	21·19
5	204·88	0·00	+6·76	+5·85	8·94	310·9	23·33
6	217·07	+0·02	+5·86	+4·97	7·68	310·3	24·49
7	229·26	+0·05	+4·76	+3·88	6·14	309·2	24·56
8	241·46	+0·08	+3·51	+2·64	4·40	307·0	23·59
9	253·66	+0·10	+2·15	+1·28	2·50	300·8	21·63
10	265·86	+0·13	+0·74	−0·12	0·75	260·8	18·70
11	278·06	+0·15	−0·69	−1·52	1·67	155·6	14·93
12	290·26	+0·17	−2·09	−2·85	3·54	143·7	10·44
13	302·46	+0·20	−3·42	−4·06	5·31	139·9	5·45
14	314·65	+0·23	−4·63	−5·11	6·90	137·8	0·20
15	326·84	+0·25	−5·70	−5·94	8·23	136·2	354·92
16	339·03	+0·28	−6·55	−6·52	9·25	134·9	349·87
17	351·20	+0·30	−7·14	−6·79	9·86	133·6	345·24
18	3·38	+0·33	−7·42	−6·74	10·03	132·3	341·30
19	15·54	+0·36	−7·34	−6·33	9·70	130·8	338·20
20	27·70	+0·39	−6·87	−5·56	8·84	129·0	336·14
21	39·85	+0·42	−5·99	−4·44	7·45	126·5	335·33
22	51·99	+0·45	−4·71	−3·01	5·59	122·6	335·98
23	64·13	+0·48	−3·08	−1·34	3·36	113·5	338·21
24	76·26	+0·51	−1·20	+0·45	1·28	69·4	342·04
25	88·39	+0·54	+0·81	+2·22	2·36	340·0	347·28
26	100·52	+0·57	+2·80	+3·82	4·73	323·8	353·49
27	112·65	+0·60	+4·61	+5·14	6·91	318·1	0·06
28	124·78	+0·63	+6·10	+6·09	8·62	315·0	6·41
29	136·93	+0·66	+7·17	+6·63	9·77	312·8	12·07
30	149·07	+0·68	+7·78	+6·77	10·31	311·0	16·78
Dec. 1	161·23	+0·71	+7·91	+6·53	10·25	309·5	20·27
2	173·38	+0·73	+7·61	+5·97	9·67	308·1	22·91
3	185·55	+0·76	+6·92	+5·14	8·62	306·6	24·32
4	197·72	+0·78	+5·93	+4·09	7·20	304·6	24·66

Greenwich Midnight.	Selenographical Colong.	Lat. of the Sun.	Geocentric Libration Sel. Long.	Lat. of the Earth.	Combined Amount.	Direc- tion.	C.
1901. Dec. 5	209·90	+ 0·80	+ 4·71	+ 2·88	5·52	301·4	23·96
6	222·08	+ 0·82	+ 3·35	+ 1·56	3·70	295·0	22·23
7	234·26	+ 0·84	+ 1·92	+ 0·18	1·93	275·4	19·55
8	246·45	+ 0·86	+ 0·49	− 1·20	1·30	202·2	15·97
9	258·64	+ 0·88	− 0·90	− 2·54	2·69	160·5	11·63
10	270·83	+ 0·90	− 2·20	− 3·77	4·37	149·7	6·73
11	283·02	+ 0·92	− 3·37	− 4·84	5·89	145·2	1·47
12	295·21	+ 0·94	− 4·39	− 5·71	7·21	142·4	356·13
13	307·39	+ 0 96	− 5·24	− 6·33	8·21	140·4	350·98
14	319·57	+ 0·98	− 5·90	− 6·65	8·89	138·4	346·24
15	331·75	+ 1·00	− 6·36	− 6·66	9·21	136·3	342·13
16	343·93	+ 1·02	− 6·58	− 6·33	9·13	133·9	338·87
17	356·09	+ 1·05	− 6·54	− 5·66	8·65	130·9	336·57
18	8·26	+ 1·07	− 6·22	− 4·67	7·78	126·9	335·41
19	20·41	+ 1·09	− 5·59	− 3·38	6·53	121·2	335·56
20	32·55	+ 1·11	− 4·63	− 1·86	4·99	111·9	337·15
21	44·69	+ 1·14	− 3·36	− 0·19	3·36	93·2	340·25
22	56·82	+ 1·16	− 1·81	+ 1·52	2·36	50·0	344·79
23	68 95	+ 1·18	− 0·06	+ 3·15	3·15	1·1	350·51
24	81·07	+ 1·20	+ 1·76	+ 4·56	4·89	338·9	356·98
25	93·19	+ 1·22	+ 3·53	+ 5 65	6·66	328·0	3·54
26	105·31	+ 1·24	+ 5·06	+ 6·35	8·12	321·5	9·67
27	117·44	+ 1·26	+ 6·24	+ 6·62	9·10	316·7	14·96
28	129·57	+ 1·28	+ 6·98	+ 6·49	9·53	312·9	19·17
29	141·71	+ 1·29	+ 7·23	+ 6·01	9·39	309·7	22·18
30	153·86	+ 1·30	+ 7·02	+ 5·23	8·75	306·7	23·99
31.	166 01	+ 1·32	+ 6·39	+ 4·21	7·65	303·4	24·69
1902. Jan. 1	178·16	+ 1·33	+ 5·41	+ 3·03	6·20	299·2	24·28

The longitudes are reckoned in the plane of the Moon's equator, the axis of reference being the radius which passes through the mean centre of the visible disc. This axis therefore rotates with the Moon, and is not fixed in space.

The inclination of the Moon's equator to the ecliptic is taken as 1°·523, the value used in the *Connaissance des Temps*, that given by the *Nautical Almanac* being 1°·536.

The physical librations in longitude and latitude, as given by Professor Franz's formulæ, have been applied; their values are taken from the *Berliner Jahrbuch* for the days given there, and interpolated by a graphical method for the other days. But the

signs in the *Jahrbuch* require to be reversed in order to reduce to the system used here.

The colongitude of the Sun is 90° (or 450°) *minus* his selenographical longitude. It also is the selenographical longitude of the morning terminator reckoned eastward from the mean centre of the disc. Hence its value is approximately 270°, 0°, 90°, 180° at new Moon, first quarter, full Moon, last quarter respectively. The longitude of the evening terminator is of course 180° greater or less than that of the morning one.

When the geocentric libration in longitude is positive, the region brought into view is on the west limb; when negative, on the east.

When the geocentric libration in latitude is positive, the region brought into view is at the Moon's north pole; when negative, at the south.

The column "Combined Amount" gives the distance between the apparent and mean centres of the disc, and the column "Direction" gives the position-angle of the apparent centre from the mean centre, or, which is the same thing, the position-angle of the region which is most carried into view by libration. The angles are reckoned eastward from the northern extremity of the Moon's axis.

C denotes the geocentric position-angle of the northern extremity of the Moon's axis measured eastward from the northernmost point of the disc. This quantity is given now for the first time, at the suggestion of Professor W. H. Pickering. It has been computed by the second formula given in the Preface to the *Nautical Almanac*, but the coordinates of the Moon's equator have been taken from the *Connaissance des Temps*, so as to make this column consistent with the rest of the ephemeris.

The terms "East" and "West" are used throughout with reference to our sky, and not as they would appear to an observer on the Moon.

At the suggestion of Mr. S. A. Saunder I give the method for finding the altitude of the Sun at a given point on the Moon whose position is defined : (1) by selenographical longitude and latitude ; (2) by direction cosines.

In either case the Sun's selenographical colongitude and latitude (K, L supposed) must be found by interpolation from the ephemeris for the given time.

In the first case let the given point be in the position longitude M, latitude N. Longitudes are reckoned from the meridian passing through the mean centre of the disc, and the positive direction is that towards Mare Crisium. North latitudes are considered positive.

Then

$$\text{sine Sun's altitude} = \sin L \sin N + \cos L \cos N \sin (K + M).$$

In the second case let ξ, η, ζ be the direction cosines of the given point. The axes are (1) that diameter of the Moon's

equator which is 90° from the mean centre of the disc ; (2) the Moon's polar axis ; (3) the diameter through the mean centre of the disc.   The positive directions are as above.   Mr. Saunder, I understand, proposes to issue some maps of portions of the Moon's surface from which the coordinates ξ, η, ζ can be taken at sight.

Then the Sun's direction cosines are :

$$\cos K \cos L, \ \sin L, \ \sin K \cos L,$$

and sine Sun's altitude

$$= \xi \cos K \cos L + \eta \sin L + \zeta \sin K \cos L.$$

Neither formula is convenient when the Sun's altitude is very great, for an angle near 90° cannot be accurately determined from its sine.   However, when the Sun is high the shadows are so inconspicuous that it is not necessary to compute his altitude with great accuracy.

Examples :

(1) To find the Sun's altitude at Mösting A, 1901 April 27$^\mathrm{d}$ 9$^\mathrm{h}$, G.M.T.

By interpolation from the ephemeris K = 19°·68, L = + 0°·45.

Place of Mösting A, M = − 5° 10′·3,   N = − 3° 11′·4.
(From *Monthly Notices*, lx. 3, p. 181).

∴ sine Sun's altitude

$$= -\sin 0°·45 \sin 3° 11'·4 + \cos 0°·45 \cos 3° 11'·4 \sin (19°·68 - 5°·17)$$
$$= -·0007 + ·2502 = + ·2495.$$

∴ Sun's altitude = 14°·45.

(2) To find the Sun's altitude at Euclides 1901 October 25$^\mathrm{d}$ 13$^\mathrm{h}$, G.M.T.   By interpolation from the ephemeris K = 0°·64, L = − 0°·33.

Place of Euclides ξ = − ·4887, η = − ·1281.
(From *Monthly Notices*, lx. 3, p. 182.)

And $\zeta = \sqrt{1 - \xi^2 - \eta^2} = \sqrt{1 - ·2388 - ·0164} = \sqrt{·7448}$
$$= + ·8630.$$

Then sine Sun's altitude = − ·4887 cos 71°·64 cos 0°·33

$$+ ·1281 \sin 0°·33$$
$$+ ·8630 \sin 71°·64 \cos 0·33$$
$$= -·1539 \qquad + ·0001 \qquad + ·8190 \qquad = + ·6652$$

Hence, Sun's altitude = 41°·70.

Benvenue, 55 Ulundi Road, Blackheath, S.E.
        1900 *October* 27.

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